# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005


Job No.: CTCE/BBMP/W.No.11/KRIDL/WMM/Gradation/2014-15 21.07.2014

## GRADATION FOR WMM
## MORTH TABLE-400-11

**Client** : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

**Agency** : **Technical Manager,** KRIDL, Bangalore.

**Name of Work** : Improvements to Cross Roads and Drains at Naidu Layout in Ward No.11, (Kuvempunagara) Vidyaranyapura Sub Division, BBMP, Bangalore.

**Reference** : AEE/VSD/PR/175/1/2014-15 Dated: 19.07.2014

Date of Testing : 21.07.2014

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **26000**

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 890 | 890 | 3.4 | 96.6 | 95-100 |
| 22.4 | 5495 | 6385 | 24.6 | 75.4 | 60-80 |
| 11.2 | 5585 | 11970 | 46.0 | 54.0 | 40-60 |
| 4.75 | 4130 | 16100 | 61.9 | 38.1 | 25-40 |
| 2.36 | 4155 | 20255 | 77.9 | 22.1 | 15-30 |
| 0.600 | 2585 | 22840 | 87.8 | 12.2 | 8-22 |
| 0.075 | 2875 | 25715 | 98.9 | 1.1 | 0-8 |

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Bangalore-560079.

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Job No.: CTCE/BBMP/W.No.11/KRIDL/WMM/Gradation/2014-15

21.07.2014

## GRADATION FOR WMM
## MORTH TABLE-400-11

**Client** : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

**Agency** : **Technical Manager,** KRIDL, Bangalore.

**Name of Work** : Improvements to Cross Roads and Drains at Naidu Layout in Ward No.11, (Kuvempunagara) Vidyaranyapura Sub Division, BBMP, Bangalore.

**Reference** : AEE/VSD/PR/175/1/2014-15 Dated: 19.07.2014

Date of Testing : 21.07.2014

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **25245**

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 855 | 855 | 3.4 | 96.6 | 95-100 |
| 22.4 | 5295 | 6150 | 24.4 | 75.6 | 60-80 |
| 11.2 | 5410 | 11560 | 45.8 | 54.2 | 40-60 |
| 4.75 | 4185 | 15745 | 62.4 | 37.6 | 25-40 |
| 2.36 | 4050 | 19795 | 78.4 | 21.6 | 15-30 |
| 0.600 | 2415 | 22210 | 88.0 | 12.0 | 8-22 |
| 0.075 | 2650 | 24860 | 98.5 | 1.5 | 0-8 |

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ಯಲಹಂಕ ವಲಯ,
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Job No.: CTCE/BBMP/W.No.11/KRIDL/WMM/AIV/2014-15 21.07.2014

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| **Client** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Technical Manager,** KRIDL, Bangalore. |
| **Name of the Work** | Improvements to Cross Roads and Drains at Naidu Layout in Ward No.11, (Kuvempunagara) Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | AEE/VSD/PR/175/1/2014-15 Dated: 19.07.2014 |
| **Source / Location** | WMM Plant |
| **Type of Mix** | Wet Mix macadam |
| **Date of Testing** | 21.07.2014 |

| Sl No. | Details | Trial No. 1 | Trial No. 2 | Average |
|---|---|---|---|---|
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 389 | 390 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 88 | 89 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 301 | 301 | |
| 4 | Aggregate Impact value = percent fines | 22.62 | 22.82 | |
| | 100* ($W_2/W_1$)% | | | 22.72 |

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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ಬೃ ಬೆಂ. ಮ. ಪಾ., ಬೆಂಗಳೂರು-97.

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Job No.: CTCE/BBMP/W.No.11/KRIDL/WMM/S-T/2014-15 21.07.2014

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Agency | **Technical Manager**, KRIDL, Bangalore. |
| Name of Work | Improvements to Cross Roads and Drains at Naidu Layout in Ward No.11, (Kuvempunagara) Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference | AEE/VSD/PR/175/1/2014-15 Dated: 19.07.2014 |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2011) |
| Type of Mix | Wet Mix Macadam |
| Date of Testing | 21.07.2014 |

Result : Flakiness Index = **11.25%**

Elongation Index = **13.10%**

**Result : Combined Flakiness & Elongation index 24.35%**

**Comments:**

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.11/KRIDL/SDBC/AIV/2014-15 24.07.2014

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| **Client** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Technical Manager,** KRIDL, Bangalore. |
| **Name of the Work** | Improvements to Cross Roads and Drains at Naidu Layout in Ward No.11, (Kuvempunagara) Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | AEE/VSD/PR/175/1/2014-15 Dated: 19.07.2014 |
| **Source / Location** | Hot Mix Plant, Bangalore |
| **Type of Mix** | Semi Dense Bituminous Concrete |
| 28.07.2014 | 24.07.2014 |

| Sl No. | Details | Trial No. 1 | Trial No. 2 | Average |
|---|---|---|---|---|
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 389 | 390 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 89 | 90 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 300 | 300 | |
| 4 | Aggregate Impact value = percent fines<br>100* ($W_2/W_1$)% | 22.88 | 23.08 | 22.98 |

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

**Note:**

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**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005


Job No.: CTCE/BBMP/W.No.11/KRIDL/SDBC/Bitumen/2014-15 24.07.2014

## BITUMEN CONTENT AND GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

### AASHTO T 164 & AASHTO T 30

| | |
|---|---|
| CLIENT | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, |
| AGENCY | **Technical Manager,** KRIDL, Bangalore. |
| NAME OF THE WORK | Improvements to Cross Roads and Drains at Naidu Layout in Ward No.11, (Kuvempunagara) Vidyaranyapura Sub Division, BBMP, Bangalore. |
| REFERENCE | AEE/VSD/PR/175/1/2014-15 Dated: 19.07.2014 |
| SAMPLE I/D | Roads and Drains at Naidu Layout in Ward No.11 |
| DATE OF TESTING | 24.07.2014 |

### BITUMEN CONTENT DETERMINATION

| Description | Trail 1 | Trail 2 |
|---|---|---|
| 1. Weight of Mixture before Test, g | 500 | 500 |
| 2. Weight of Mixture after Test, g | 473 | 475 |
| 3. Weight of Asphalt and Mineral matter Extracted, | - | - |
| 4. Weight of Mineral Matter, g. | - | - |
| 5. Weight of Ash, g | | |
| 6. Weight of Bitumen Extracted, g. (corrected) | 27 | 25.00 |
| 7. Bitumen content in % | 5.40 | 5.00 |
| 8. Average | **5.20** | |

### GRADATION AFTER EXTRACTION

| SIEVE SIZE | Trail 1 | | | | JOBMIX |
|---|---|---|---|---|---|
| mm | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing | Gradation |
| 13.2 | 0 | 0 | 0 | 100 | 100 |
| 9.5 | 37.52 | 7.93 | 7.93 | 92.07 | 90-100 |
| 4.75 | 262.1 | 55.41 | 63.34 | 36.66 | 35-51 |
| 2.36 | 57.86 | 12.23 | 75.58 | 24.42 | 24-39 |
| 1.18 | 40.21 | 8.50 | 84.08 | 15.92 | 15-30 |
| 0.3 | 28.32 | 5.99 | 90.07 | 9.93 | 9-19 |
| 0.075 | 27.15 | 5.74 | 95.81 | 4.19 | 3-8 |

| SIEVE SIZE | Trail 2 | | | | JOBMIX |
|---|---|---|---|---|---|
| mm | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing | Gradation |
| 13.2 | 0 | 0 | 0 | 100 | 100 |
| 9.5 | 25.85 | 5.17 | 5.17 | 94.83 | 90-100 |
| 4.75 | 242.6 | 48.52 | 53.69 | 46.31 | 35-51 |
| 2.36 | 93.82 | 18.76 | 72.45 | 27.55 | 24-39 |
| 1.18 | 52.1 | 10.42 | 82.87 | 17.13 | 15-30 |
| 0.3 | 33.42 | 6.68 | 89.56 | 10.44 | 9-19 |
| 0.075 | 22.78 | 4.56 | 94.11 | 5.89 | 3-8 |

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Job No.: CTCE/BBMP/W.No.11/KRIDL/SDBC/Shape_T/2014-15 : 24.07.2014

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Client | : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Agency | : **Technical Manager,** KRIDL, Bangalore. |
| Name of Work | : Improvements to Cross Roads and Drains at Naidu Layout in Ward No.11, (Kuvempunagara) Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference | : AEE/VSD/PR/175/1/2014-15 Dated: 19.07.2014 |
| Technical Reference | : IS 2386(Part 1) 1963 (RA 2007) |
| Type of Mix | : Semi Dense Bituminous Concrete |
| Date of Testing | : 24.07.2014 |

Result : Flakiness Index = **12.35%**

Elongation Index = **13.90%**

Result : Combined Flakiness & Elongation index **26.25%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.11/KRIDL/SDBC/Stripping/2014-15 24.07.2014

## Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

| | |
|---|---|
| **Client** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Technical Manager,** KRIDL, Bangalore. |
| **Name of the work** | Improvements to Cross Roads and Drains at Naidu Layout in Ward No.11, (Kuvempunagara) Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | AEE/VSD/PR/175/1/2014-15 Dated: 19.07.2014 |
| **Type of Mix** | Semi Dense Bituminous Concrete |
| **Date of Testing** | 24.07.2014 |

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

| Observation Number | Stripping, Percentage | Average, Percentage | Average Retained Coating, % |
|---|---|---|---|
| 1 | 3.3 | 3.30 | 96.70 |
| 2 | 3.2 | | |
| 3 | 3.4 | | |

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Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.11/KRIDL/SDBC/Sp_Wa/2014-15 24.07.2014

## Specific Gravity And Water Absorption Test

IS: 2386 Part III

| | |
|---|---|
| **Client** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Technical Manager,** KRIDL, Bangalore. |
| **Name of the Work** | Improvements to Cross Roads and Drains at Naidu Layout in Ward No.11, (Kuvempunagara) Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | AEE/VSD/PR/175/1/2014-15 Dated: 19.07.2014 |
| **Type of Mix** | Semi Dense Bituminous Concrete |
| **Source / Location** | Hotmix Plant, Bangalore |
| **Date of Testing** | 24.07.2014 |

| Sl. No. | Details | Notation | Test Number | | | Mean Value |
|---|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 | |
| 1 | Weight of aggregate suspended in water with the basket | $W_1$ g | 2020 | 2025 | 2024 | |
| 2 | Weight of basket suspended in water | $W_2$ g | 755 | 755 | 755 | |
| 3 | Weight of saturated aggregate in water | $(W_1 - W_2) = W_s$ g | 1265 | 1270 | 1269 | |
| 4 | Weight of saturated surface dry aggregate in air | $W_3$ g | 2021 | 2015 | 2012 | |
| 5 | Weight of water equal to the volume of the aggregate | $(W_3 - W_S)$ g | 756 | 745 | 743 | |
| 6 | Weight of oven dried aggregate | $W_4$ g | 1999 | 1998 | 2008 | |
| 7 | Specific Gravity | $W_4/(W_3-W_S)$ | 2.644 | 2.682 | 2.703 | 2.676 |
| 8 | Apparent Specific gravity | $W_4/(W_4-W_S)$ | 2.723 | 2.745 | 2.717 | 2.728 |
| 9 | Water Absorption | $((W_3-W_4)*100)/W_4$ | 1.10% | 0.85% | 0.20% | 0.72% |

**Comments:**

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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